

Remarks

Specification

The Specification was objected to because the Specification does not describe new Figure 10 or mention that the light source is within the camera control unit.

The Specification has been amended at paragraph 0034 to disclose a light source mounted within the camera control unit. The Specification now comports with Claim 14 as filed. Paragraph 0034 has also been amended to reflect Figure 2 as filed to show that a cable engages the camera head so as to direct light longitudinally completely through the camera head. MPEP 608.01(I).

Claim Rejections – 35 USC § 112

Claims 23, 63 and 64 are rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

Claim 23 has been amended to depend from Claim 1.

Claim 63 has been amended to include the recitation that the information further comprises image data generated from the light reflected from the object.

Claim 64 has been amended to depend from Claim 63.

Claim Rejections – 35 USC § 102

Claims 1 – 8, 15 – 22, 26 -31, 34 – 37, 46, 47, 50 – 56 and 58 – 67 stand rejected under 35 USC § 102(b) as being anticipated by Monroe et al. (U.S. Pat. 5,311,859). The Applicant requests that the Examiner reconsider these rejections in view of the above Amendments and following Remarks.

In one embodiment, the present invention is directed to a video imaging system and in particular a system including the unique feature of a cable longitudinally engaging a camera head so as to direct light longitudinally completely through the camera head, for connecting the camera head to the camera control unit. By so engaging the cable to the camera head a more compact and ergonomically more efficient device is realized. Such a compact and ergonomically efficient design is important in the close confines of a surgical operating scene where there are numerous personnel and surgical apparatus that need to be kept clear of one another. The cable includes a single protective jacket enclosing at least one channel for transmitting information between the camera head and the camera control unit. A light guide transmits light from the light source to an object. The camera head is receptive of light reflected from the object thereby generating the image data.

In a second embodiment the video imaging system includes a light source mounted within the camera control unit. A cable includes a single protective jacket which encloses at least one electrical channel for transmitting image data and a control signal in the nature of camera operating information from the camera head to the camera control unit. A light guide transmits light from the light source to an object. In addition, the command and control signals may be bi-directionally transmitted between the camera head and control unit.

In contrast, Monroe et al. merely teaches an add-on camera assembly 20 including a flexible tubular umbilical 30 which carries signal and power conductors. A wiring bundle within a power and light supply unit 36 carries video signals which are then supplied to an associated video monitor 38. (*Col. 3, l. 56 - Col. 4, l.12*).

Monroe et al. fails to teach or disclose, either explicitly or implicitly, Applicant's unique feature of a cable longitudinally engaging the camera head so as to direct light longitudinally completely through the camera head. In fact Monroe et al. distinctly teaches a device wherein light is *not* directed completely through the camera head. Such teaching away is clearly shown in Figure 1 of Monroe et al. and described as "a flexible light conduit 40 connects between the housing 24 of the handle 22 and a light conduit fitting 42 on the laparoscope lens tube 12. This carries the fiber optic bundle to the lens tube and provides the light which is then carried through a successive fiber optic bundle within the lens tube 12, which illuminates a target within the viewing area of the objective 14." (*Col. 4, l. 13 – 20*). Thus, as seen in Figure 1 of Monroe et al., light is directed to a laparoscope housing 24 and then *out* of the laparoscope and through the flexible light conduit 40 to the light guide fitting 42, thence to the lens tube 12.

Nor does Monroe et al. disclose Applicant's unique feature of a guide element spanning the camera control unit and coupled to the first and/or second cables. Still further, Monroe et al. fails to disclose a light guide positioned in and aligned along the first and/or second cables and the guide element for transmitting light from a light source to an object.

Applicants therefore submit that Claims 1, 26, 46, 56, 60 and 67, as amended, and new Claim 73 are clearly not anticipated by Monroe et al. Notification of that fact is respectfully requested. Applicants also submit that Claims 2 - 8, 15 - 22, and Claims 27

- 31, 34 - 37, 47 - 53, 54, 55, 57 - 59, 61 - 64, 65, 66, 68 - 73, which depend variously from Claims 1, 26, 46, 56, 60 and 67, are therefore also not anticipated by Monroe et al. for at least the same reasons set forth with respect to Claims 1, 26, 46, 56, 60 and 67. Notification of that fact is respectfully requested.

Claim Rejections – 35 USC § 103

Claims 1 - 8, 10, 12, 15 - 22, 26 - 31, 34 - 37, 46, 47, 50 - 56 and 58 - 67 stand rejected under 35 U.S.C. 103(a) as being unpatentable over D'Alfonso et al. in view of Monroe et al. or Konomura et al. (U.S. 6,388,702).

D'Alfonso discloses a video camera system for use in endoscopy where a camera control unit is coupled to a camera head by a cable. The "camera control unit 1 may also include connector 22 which couples the camera control unit 1 to the cable 5." (*Col. 3, l. 8 - 10*). Monroe et al. teaches "a flexible light conduit 40" which connects a housing and a fitting and carries a fiber optic bundle. (*Col. 4, l. 13 - 16; Figs. 1 & 2*). Konomura et al. teaches an electronic endoscope having image processing apparatus and a light guide. (*Col. 6, l. 1 - Col. 7, l. 2*). However, neither D'Alfonso, Monroe et al. or Konomura, either alone or in combination, teach or even suggest a cable longitudinally engaging the camera head so as to direct light longitudinally completely through the camera head. Indeed the video camera of Monroe et al. is an add-on arrangement "using a traditional optical laparoscope." (*Col. 3, l. 7 - 8*). Such devices typically include a connection as shown as a light guide fitting 42 in Figure 1 of Monroe et al. where an optical signal is coupled to a lens tube at an angle to the lens tube. Thus, the light path cannot pass longitudinally completely through the camera.

Nor do D'Alfonso, Monroe et al. or Konomura teach or suggest a guide element linearly spanning the camera control unit and coupled to the first and second cables, nor a light guide positioned in and aligned along the first and/or second cables and the

guide element for transmitting light from the light source to an object through the camera head.

Thus, Applicants respectfully submit that there would have been no motivation to modify or combine D'Alfonso, Monroe et al. or Konomura to arrive at the present invention and that therefore, Claims 1 – 8, 10, 12, 15 – 22, 26 – 31, 34 – 37, 46, 47, 50 – 56 and 58 – 67 are non-obvious over D'Alfonso in view of Monroe et al. or Konomura.

Claims 9, 11, 32 and 57 stand rejected under 35 U.S.C. 103(a) as being unpatentable over 1) Monroe et al. in view of McKenna et al. (U.S. 6,261,266) and separately over 2) D'Alfonso et al. in view of Monroe et al. or Konomura et al. and further in view of McKenna et al. for the reasons set forth in numbered paragraph 12, paper 2 of the previous Office Action.

McKenna et al. teaches a multiple view endoscope comprising image output and/or non-visual sensors may be multiplexed. (*Col. 21, l. 40 – 45*). These may include temperature, pressure, chemical composition, radiation or other types. (*Col. 14, l. 25 – 35*). Monroe, Konomura et al. and D'Alfonso fail to disclose multiplexing or demultiplexing image data and a control signal in the nature of camera operating information from a camera head to a camera control unit. Neither Monroe et al. in view of McKenna et al. or D'Alfonso in view of Monroe et al. or Konomura et al. and further in view of McKenna et al., either alone or in combination, teach or even suggest multiplexing or demultiplexing a control signal and image data.

Thus, Applicants respectfully submit that there would have been no motivation to modify or combine D'Alfonso, Monroe et al., Konomura or McKenna to arrive at the present invention in Claims 9, 11, 32 and 57 and that therefore, Claims 9, 11, 32 and 57 are non-obvious over over 1) Monroe et al. in view of McKenna et al. (U.S.

6,261,266) and separately over 2) D'Alfonso et al. in view of Monroe et al. or Konomura et al. and further in view of McKenna et al.

Claim 23 stands rejected under 35 U.S.C. 103(a) as being unpatentable over 1) Monroe et al. in view of Hattori (U.S. 4,356,534) and separately over 2) D'Alfonso et al. in view of Monroe et al. or Konomura et al and further in view of Hattori for the reasons set forth in numbered paragraph 15, paper 2 of the previous Office Action.

Hattori teaches the use of a dimmer circuit including a thyristor to gradually control the output of light and extinguish a lamp. (*Col. 2, l. 2 – 53*). In addition Hattori teaches the use of an electromagnetic spring loaded shutter plate that is actuated when a solenoid is demagnetized. (*Col. 3, l. 16 - 48*). The shutter plate moves in a rectilinear direction when actuated in contrast to the rotational motion of the light deflector of the present invention. Konomura teaches a rotary filter 333, 433 with color filters for transmitting red, green and blue. (*Figs. 17 and 19*). The rotary filters are *not* light deflectors. They *allow* the passage of light at certain wavelengths. D'Alfonso et al. and Monroe et al. fail to teach any light deflectors and Applicants can not ascertain the relevance of D'Alfonso et al. or Montoe et al. Thus, neither Monroe et al., D'Alfonso or Konomura, nor Hattorii disclose a light deflector, pivotally mounted along a path between a light source and a light guide, to sever the path whenever a cable is disconnected from the camera control unit.

Thus, Applicants respectfully submit that there would have been no motivation to modify or combine Hattori, D'Alfonso, Monroe et al., Konomura or McKenna to arrive at the present invention and that Claim 23 is non-obvious and therefore patentable over 1) Monroe et al. in view of Hattori (U.S. 4,356,534) and separately over 2) D'Alfonso et al. in view of Monroe et al. or Konomura et al and further in view of Hattori.

Claims 24, 25, 38, 39, 48 and 49 stand rejected under 35 U.S.C. 103(a) as being unpatentable over 1) Monroe et al. in view of "Interface Circuits for TIA/EIA-644 (LVDS) Design Notes" and separately over 2) D'Alfonso et al. in view of Monroe et al. or Konomura et al. and further in view of "LVDS Design Notes", for the reasons set forth in paragraph 13 of the previous Office Action, paper number 2.

The "Interface Circuits for TIA/EIA-644 (LVDS) Design Notes" teaches "the intended application of this signaling technique is baseband data transmission over controlled impedance media" and "that transmission media may be printed circuit board (PCB) traces, backplanes, or cables" (*pg. 1, first paragraph under "General Information."*), and that drivers "are commonly implemented as current-mode devices." (*pg. 2, first paragraph under "Electrical Characteristics, Driver"*). In differential signaling, e.g. Low Voltage Differential signaling, a differential voltage is measured across two channels, i.e., not with respect to ground. In this way, noise in the measured signal is reduced due to noise cancellation in the two channels. The "Interface Circuits for TIA/EIA-644 (LVDS) Design Notes" fail to teach or disclose a control signal and image data being transmitted utilizing a digital serial protocol. D'Alfonso shows voltage measurements taken with respect to electrical ground. (*Fig. 3*). Neither D'Alfonso et al., Monroe et al. nor Konomura et al. disclose a digital serial protocol.

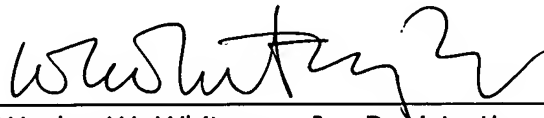
Thus, Applicants respectfully submit that there would have been no motivation to modify or combine the "Interface Circuits for TIA/EIA-644 (LVDS) Design Notes" D'Alfonso et al., Monroe et al. nor Konomura et al. to arrive at the present invention and that Claims 24, 25, 38, 39, 48 and 49 are non-obvious over 1) Monroe et al. in view of "Interface Circuits for TIA/EIA-644 (LVDS) Design Notes" and separately over 2) D'Alfonso et al. in view of Monroe et al. or Konomura et al. and further in view of "LVDS Design Notes".

In new Claims 68 – 73, the prior art fails to disclose either alone or in combination a plug for terminating a first cable and a receptacle in the camera control unit for receiving the plug and a guide element.

Nor does the cited art teach or disclose a first cable, for connecting a camera head to a camera control unit, said first cable including a single protective jacket enclosing at least one channel for transmitting information between said camera head and said camera control unit; a second cable extending between the light source and the first cable through the camera control unit directly engaging the first cable

Therefore, the Applicants respectfully submit that Claims 1 – 40 and 46 – 67 and, as amended, and new Claims 68 – 73 are clearly patentable over the cited art and stand in condition for allowance. Notification of that fact is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Wesley W. Whitmyer, Jr.', written over a horizontal line.

Wesley W. Whitmyer, Jr., Registration No. 33,558
George J. Lyman, Registration No. 44,884
Attorneys for Applicants
ST. ONGE STEWARD JOHNSTON & REENS LLC
986 Bedford Street
Stamford, CT 06905-5619
203 324-6155